

What Is Claimed Is:

1. A process for preparing an improved catalyst, said process comprising:

(a) providing a mixed metal oxide having the empirical formula



5 wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb, Lu, Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y, Sm, Tb, Br, Cu, Sc, Cl, F and I,

10 wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

15 wherein, when a = 1, b = 0.1 to 2, c = 0.1 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements;

15 (b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

20 (c) recovering insoluble material from said contact mixture; and

20 (d) calcining said recovered insoluble material in a non-oxidizing atmosphere to form said improved catalyst.

2. The process for preparing an improved catalyst according to claim 1, wherein the mixed metal oxide of (a) is an orthorhombic phase mixed metal oxide.

25 3. The process for preparing an improved catalyst according to claim 1, wherein said liquid contact member is an aqueous solution of oxalic acid.

4. The process for preparing an improved catalyst according to claim 1, wherein said liquid contact member is an aqueous solution of telluric acid.

5. The process for preparing an improved catalyst according to claim 1, wherein said liquid contact member is an aqueous solution of nitric acid.

30 6. The process for preparing an improved catalyst according to claim 1, wherein said calcined recovered solid material is ground.

7. A catalyst produced by the process according to claim 1.

8. A process for producing an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process according to claim 1.

9. A process for producing an unsaturated carboxylic acid which comprises subjecting 5 an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process comprising:

(a) providing a mixed metal oxide having the empirical formula



wherein A is at least one element selected from the group

10 consisting of Mo and W, N is at least one element selected from the

group consisting of Te, Se and Sb, and X is at least one element

selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe,

Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs,

Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Ag, Pb, P, Pm, Eu, Gd, Dy, Ho, Er,

15 Tm, Yb, Lu, Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y, Sm, Tb, Br, Cu, Sc,

Cl, F and I,

wherein A, V, N and X are present in such amounts that the atomic

ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.1 to 2, c = 0.1 to 1, d = 0.01 to 1 and e is

20 dependent on the oxidation state of the other elements,

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture; and

25 (d) calcining said recovered insoluble material in a non-oxidizing atmosphere to form said catalyst.

10. The process for producing an unsaturated carboxylic acid according to claim 9, wherein the mixed metal oxide of (a) is an orthorhombic phase mixed metal oxide.

11. The process for producing an unsaturated carboxylic acid according to claim 8, 30 wherein the calcined recovered material is ground.